

AD-A072 232

O'BRIEN AND GERE ENGINEERS INC PHILADELPHIA PA JUSTIN--ETC F/G 13/2  
NATIONAL DAM INSPECTION PROGRAM. HEMLOCK LAKE DAM (NDI-PA 00399--ETC(U)  
MAY 79

DACW31-79-C-0010

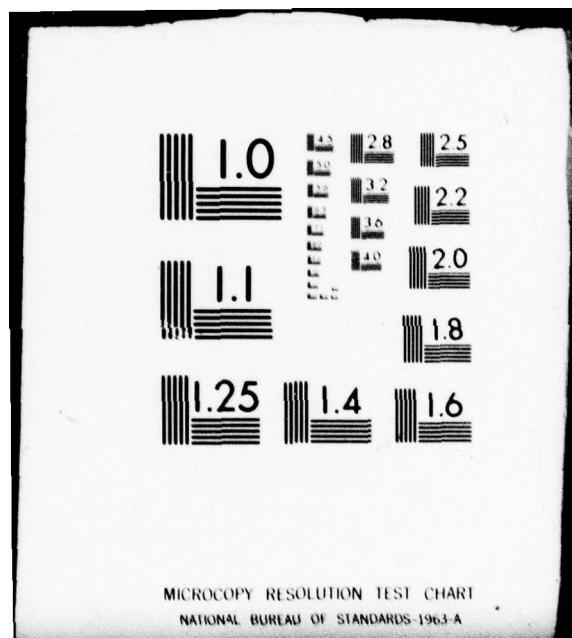
NL

UNCLASSIFIED

| OF |  
AD  
A072: 2



END  
DATE  
FILMED  
9-79  
DDC



MA 072232

DALE M. HARRIS  
DIRECTOR  
WATER POLLUTION CONTROL  
DEPARTMENT OF THE ARMY  
WATER POLLUTION CONTROL  
DIVISION  
PA 15701  
PIKE COUNTY

PENNSYLVANIA  
**HEMLOCK LAKE DAM**

NDI-PA 00359  
PA DER 52-71

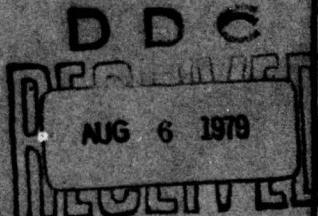
LEVEL

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

Distribution Unlimited  
Approved for Public Release  
Contract No. DACW31-79-C-0010



Prepared By  
**CHITTENDEN & GORE**  
Justin & Courtney Division  
PHILADELPHIA, PENNSYLVANIA  
19103



ORIGINAL CONTAINS COLOR PLATES: ALL DDC  
REPRODUCTIONS WILL BE IN BLACK AND WHITE

FOR

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT CORPS OF ENGINEERS  
BALTIMORE, MARYLAND  
21203

MAY 1979

08 06 05

## **DISCLAIMER NOTICE**

**THIS DOCUMENT IS BEST QUALITY  
PRACTICABLE. THE COPY FURNISHED  
TO DDC CONTAINED A SIGNIFICANT  
NUMBER OF PAGES WHICH DO NOT  
REPRODUCE LEGIBLY.**

(12)

65p

(11)

May 79

## DELAWARE RIVER BASIN

Name of Dam: Hemlock Lake Dam

County and State: Pike County, Pennsylvania

Inventory Number: PA 00399

(15)

DACW31-79-C-0010

### PHASE I INSPECTION REPORT

### NATIONAL DAM INSPECTION PROGRAM

(6)

National Dam Inspection Program.  
Hemlock Lake Dam (NDI-PA 00399,  
PA DER 52-71), Delaware River Basin,  
Tributary Bush Kill Creek, Pike  
County, Pennsylvania. Phase I  
Inspection Report.

Prepared by:

O'BRIEN & GERE ENGINEERS, INC.  
JUSTIN & COURTNEY DIVISION

For:

DEPARTMENT OF THE ARMY  
Baltimore District, Corps of Engineers  
Baltimore, Maryland 21203

410 760 911

79 08 06 05 2

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

|                    |                                     |
|--------------------|-------------------------------------|
| Accession For      |                                     |
| NTIS GRA&I         | <input checked="" type="checkbox"/> |
| DDC TAB            | <input type="checkbox"/>            |
| Unannounced        | <input type="checkbox"/>            |
| Justification      |                                     |
| By _____           |                                     |
| Distribution/      |                                     |
| Availability Codes |                                     |
| Dist.              | Avail and/or<br>special             |
| A                  | 230                                 |

PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Name of Dam: Hemlock Lake Dam ID # PA 00399  
State Located: Pennsylvania  
County Located: Pike  
Stream: Tributary of Bush Kill  
Coordinates: Latitude 41° 17.6' Longitude 75° 02.7'  
Date of Inspection: November 21, 1978

ASSESSMENT

Hemlock Lake Dam is an earth embankment approximately 450 feet long and 14 feet high at its maximum section. The top of the dam is used as a golf course fairway; therefore, the width of 150 feet is many times wider than is necessary for purposes of stability. An ungated drop spillway is located adjacent to the right abutment (looking downstream). The 122 acre lake is used for recreation by the residents of Hemlock Farms.

Examination of the results of the hydrologic and hydraulic analyses indicates that the drop spillway is capable of passing 67 percent of the Probable Maximum Flood (PMF) without overtopping of the embankment. The Spillway Design Flood (SDF) for this "High" hazard structure is the PMF. Therefore, the drop spillway is classified as "Inadequate" but not "Seriously Inadequate" because it passes more than 50 percent of the PMF.

Based on visual observations and review of the information obtained from the Pennsylvania Department of Environmental Resources, Hemlock Lake Dam is in good condition. However, several items require attention:

1. There are some small trees on the upstream and downstream slopes of the embankment. The trees should be cut at ground level.
2. Several small animal burrow holes were observed on the embankment slopes. The holes should be filled with suitable materials.
3. The operating condition of the reservoir drain gate valve should be assessed and the valve should be operated periodically.

4. A warning system should be developed. During periods of heavy rainfall, the dam should be monitored and downstream residents alerted in the event of an impending failure.

O'BRIEN & GERE ENGINEERS, INC.  
JUSTIN & COURTNEY DIVISION

*Will M. Heiser*  
Will M. Heiser, P.E.  
Vice-President  
Pennsylvania Registration #00692

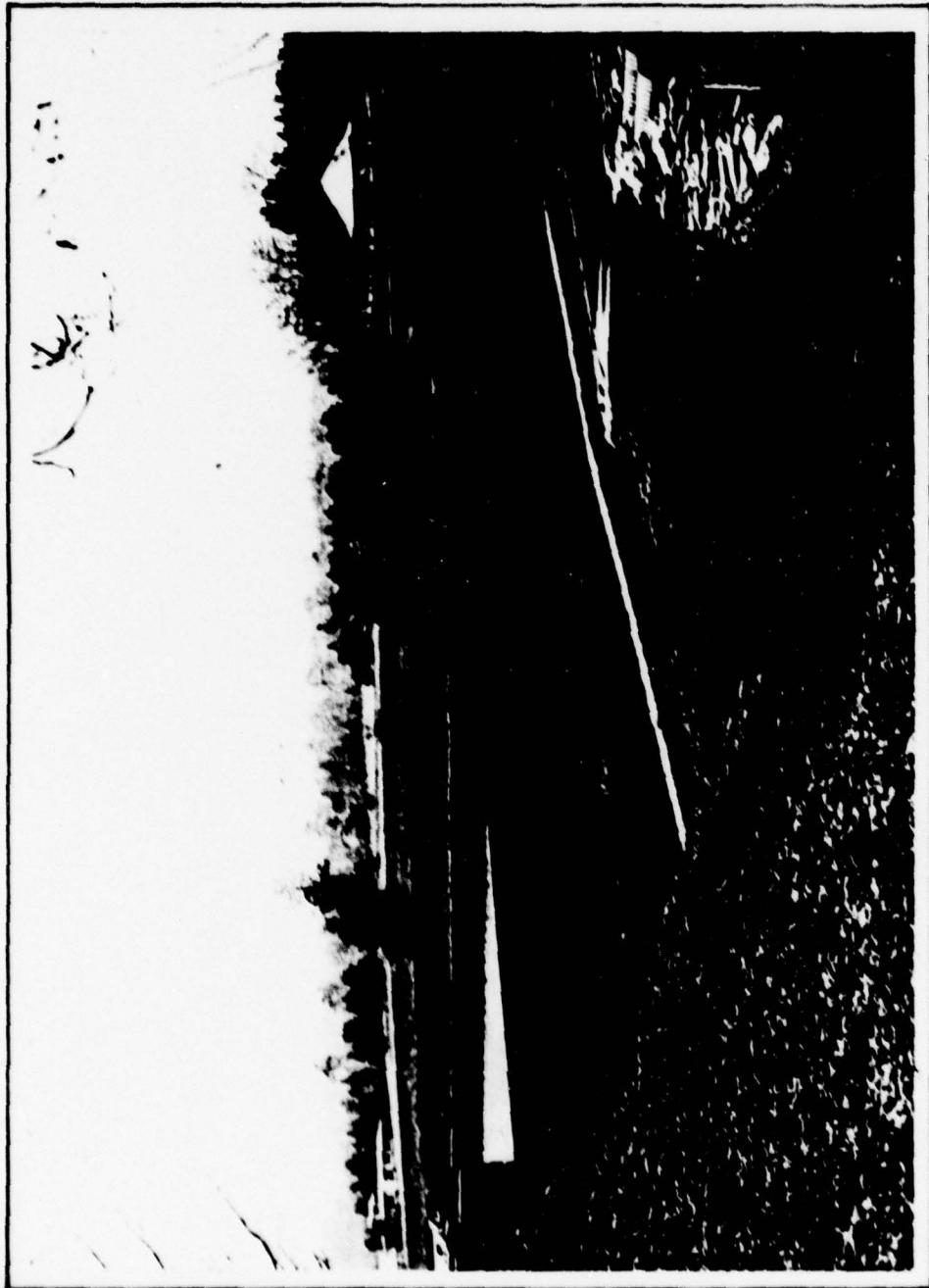


Date: 16 July 1979

*JAMES W. PECK*  
Approved By

JAMES W. PECK  
Colonel, Corps of Engineers  
District Engineer

*OVERVIEW*  
*HEMLOCK LAKE DAM, PIKE COUNTY, PENNSYLVANIA*



## TABLE OF CONTENTS

|   | <u>PAGE</u> |
|---|-------------|
| <b>SECTION 1 - PROJECT INFORMATION</b>  |             |
| 1.1 General   | 1           |
| 1.2 Description of Project  | 1           |
| 1.3 Pertinent Data  | 3           |
| <b>SECTION 2 - ENGINEERING DATA</b>   |             |
| 2.1 Design  | 5           |
| 2.2 Construction  | 5           |
| 2.3 Operation   | 5           |
| 2.4 Evaluation  | 5           |
| <b>SECTION 3 - VISUAL INSPECTION</b>  |             |
| 3.1 Findings  | 7           |
| <b>SECTION 4 - OPERATIONAL FEATURES</b>   |             |
| 4.1 Procedures  | 8           |
| 4.2 Maintenance of the Dam  | 8           |
| 4.3 Maintenance of Operating Facilities   | 8           |
| 4.4 Warning System in Effect  | 8           |
| 4.5 Evaluation of Operational Adequacy  | 8           |
| <b>SECTION 5 - HYDRAULICS AND HYDROLOGY</b>                                       |             |
| 5.1 Evaluation of Features  | 9           |
| <b>SECTION 6 - STRUCTURAL STABILITY</b>   |             |
| 6.1 Evaluation of Structural Stability  | 10          |
| <b>SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND PROPOSED<br/>REMEDIAL MEASURES</b> |             |
| 7.1 Dam Assessment  | 11          |
| 7.2 Recommendations and Proposed Remedial Measures                                | 11          |

TABLE OF CONTENTS  
(Continued)

|              |   |
|--------------|---|
| APPENDIX A - | CHECKLIST, ENGINEERING DATA, DESIGN<br>CONSTRUCTION, OPERATION, PHASE I |
| APPENDIX B - | CHECKLIST, VISUAL INSPECTION, PHASE I                                   |
| APPENDIX C - | HYDROLOGIC & HYDRAULIC DATA   |
| APPENDIX D - | PHOTOGRAPHS   |
| APPENDIX E - | DRAWINGS  |
| APPENDIX F - | SITE GEOLOGY  |

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
HEMLOCK LAKE DAM  
NDI I.D. NO. 00399  
DER # 52-71

SECTION 1

PROJECT INFORMATION

1.1 General

- a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic conditions of the Hemlock Lake Dam and to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

- ASST/PA*
- a. Description of Dam and Appurtenances. (Supplemented by information obtained from the Pennsylvania Department of Environmental Resources, Division of Dam Safety, Harrisburg, Pennsylvania).

Hemlock Lake Dam is an earth embankment with a concrete core wall. The embankment is about 625 feet long with a maximum height of approximately 14 feet. The top width of the dam is a minimum of 150 feet and the earth embankment side slopes are 3 horizontal to 1 vertical (3H:1V) both upstream and downstream. The top of the dam is used as a golf course fairway.

A drop spillway, with a round crested weir, is located adjacent to the right (looking downstream) abutment. The crest of the weir is 3 feet below the top of the dam, and the length of the weir is 47 feet. The drop spillway is of stone masonry construction except for the rounded weir crest section which is poured concrete. The distance from the drop spillway weir crest to the apron is about 7 feet. The apron is 20 feet long and slopes down from each side wall. The transverse end sill is of negligible height at the side walls and is about 2 feet high in the center. Two 24-inch semi-circular corrugated steel pipes are constructed into the end sill and act as control structures. Flow passes over the drop spillway, through the two corrugated pipes, and into Lower Lake.

The reservoir drain system is located about 320 feet left (looking downstream) of the drop spillway. It consists of a gate house, a gate

ABSTRACT

valve, and a 24-inch cast iron reservoir drain pipe. There is a reinforced concrete catwalk to the gate house.

- b. Location. Hemlock Lake Dam is located on an unnamed tributary of Bush Kill within Hemlock Farms, a recreational development, in Blooming Grove Township, Pike County, Pennsylvania. The dam site is approximately 3.5 miles northeast of Pecks Pond, Pennsylvania, and is shown on USGS Quadrangle, entitled, "Pecks Pond, Pennsylvania", at coordinates N 41° 17.6', W 75° 02.7'. A regional location plan of Hemlock Lake is enclosed as Plate 1, Appendix E.
- c. Size Classification. The dam is classified as "Intermediate" size based on its storage capacity of 1,385 acre feet.
- d. Hazard Classification. The dam is classified as a "High" hazard structure. This is consistent with its potential in the event of failure for extensive property damage and probable loss of life along the shores of Blue Heron Lake which is located a mile downstream of Hemlock Lake Dam.
- e. Ownership. Hemlock Lake Dam is owned by Home Smith International Ltd. (Hemlock Farms), Lords Valley, Hawley, Pennsylvania, 18428.
- f. Purpose of Dam. The reservoir is used for water based recreation by residents of Hemlock Farms.
- g. Design and Construction History. The application to construct Hemlock Lake Dam was submitted on August 29, 1928, by William J. Brewster. The "Report Upon the Application of William J. Brewster" was prepared on September 12, 1928, by the Commonwealth of Pennsylvania. The permit to construct Hemlock Lake Dam was issued by the Commonwealth of Pennsylvania on September 26, 1928. Construction began on May 22, 1929, and the structure was completed during the Fall of 1930. Final inspection of the project was made on December 18, 1930.

The structure was designed by W. W. Blauvelt and C. B. Hoppe, professional engineers registered in the State of New Jersey. The spillway that now exists is not the same as shown on the drawings and in photographs taken during and shortly after construction. The representative of the owner reported that there are no plans and construction history of the existing spillway structure.

- h. Normal Operating Procedures. According to the owner's representative, the reservoir is normally maintained at Elevation 1439.0. Normal discharge is through the 24-inch cast iron reservoir drain pipe. Inflow occurring when the reservoir level is at or above the drop spillway crest elevation is discharged over the drop spillway.

### **1.3 Pertinent Data**

#### **a. Drainage Area.**

|              |      |
|--------------|------|
| Square Miles | 1.18 |
|--------------|------|

**b. Discharge at Dam Site.** According to the Owner's representative, the maximum known flow at the dam site was about 285 cfs. during the Agnes storm of June, 1972. The depth of flow was approximately 1.5 feet over the weir of the drop spillway. The drop spillway capacity is about 800 cfs. with water in the reservoir at the top of the dam.

#### **c. Elevation (Feet, USGS Datum).**

|                                     |         |
|-------------------------------------|---------|
| Top of Dam                          | 1442.0  |
| Maximum Pool of Record              | 1440.5  |
| Crest of Drop Spillway, Normal Pool | 1439.0  |
| Streambed at Centerline of Dam      | 1428.0  |
| Maximum Tailwater                   | 1435.0+ |

#### **d. Reservoir (Miles).**

|   |      |
|---|------|
| Length of Maximum Pool, Top of Dam      | 0.99 |
| Length of Recreation Pool (Normal Pool) | 0.98 |

#### **e. Storage (Acre Feet).**

|   |       |
|---|-------|
| Crest of Drop Spillway, Normal Pool, Elevation 1439.0 | 918   |
| Top of Dam, Elevation 1442.0                          | 1,399 |

#### **f. Reservoir Surface (Acres).**

|   |     |
|---|-----|
| Crest of Drop Spillway, Normal Pool, Elevation 1439.0 | 122 |
| Top of Dam, Elevation 1442.0                          | 142 |

#### **g. Dam.**

|                 |                                      |
|-----------------|--------------------------------------|
| Type            | Rolled earth with concrete corewall. |
| Length          | 450 Feet                             |
| Height          | 14 Feet (maximum)                    |
| Top Width       | 150 Feet (minimum)                   |
| Side Slopes     | Upstream 3H:1V<br>Downstream 3H:1V   |
| Zoning          | None                                 |
| Impervious Core | Concrete                             |
| Cutoff          | Concrete                             |
| Grout Curtain   | None                                 |

#### **h. Diversion and Regulating Tunnel.**

Does not apply to this site.

i. Spillway.

|                 |   |
|-----------------|---|
| Type            | Drop Spillway with Round<br>Crested Weir. |
| Length of Weir  | 47 Feet                                   |
| Crest Elevation | 1439.0 Feet MSL                           |
| Gates           | None                                      |

j. Regulating Outlets.

|                 |   |
|-----------------|---|
| Reservoir Drain | 24" diameter cast iron pipe<br>with gate valve. |
|-----------------|---|

## SECTION 2

### ENGINEERING DATA

#### 2.1 Design

a. Data Available. A summary of engineering data on Hemlock Lake Dam is presented in the checklist which is part of Appendix A. Principal documents obtained from DER containing pertinent data for this report are as follows:

1. Application, Report on the Application, and Permit to construct Hemlock Lake Dam.
2. Construction progress reports.
3. Photographs made during construction and in the years following.
4. Drawings of limited value. There are no drawings of the present drop spillway.

Note: Design data are not available.

b. Design Features. The principal design features for the structure are shown on the drawings enclosed in Appendix E as Plates 2 through 4. A description of the features is discussed in Section 1.2.a.

#### 2.2 Construction

Based on review of the documentation in the DER files, examination of the limited design drawings, and discussions with the Owner's representative, it is concluded that the dam was built as proposed. However, according to the Owner's representative, no documentation is available concerning the replacement of the original spillway structure (refer to item 1.2.g).

#### 2.3 Operation Data

According to the Owner's representative, there are no formal operating procedures for the dam.

#### 2.4 Evaluation

a. Availability. All engineering data reproduced in this report and studied for this investigation were provided by DER and supplemented by conversations with the Owner's representative.

- b. Adequacy. The information made available by DER, conversations with the Owner's representative and observations made during the field investigation provided adequate data for a Phase I evaluation.
- c. Validity. There is no reason to question the validity of the data presented.

## SECTION 3

### VISUAL INSPECTION

#### 3.1 Findings

- a. General. The field inspection of Hemlock Lake Dam took place on November 21, 1978. At the time of the inspection, the reservoir surface elevation was approximately 1.0 foot below the crest of the drop spillway. The observations and comments of the field inspection team are in the checklist which is Appendix B of this report.
- b. Dam. The dam appears to be in good condition. The top of the dam is used as a golf course fairway and it is well maintained. There are a few small animal burrows and a few small birch trees on both the upstream and downstream earth embankment slopes. Because of its use as a golf course fairway, the dam has a minimum top width of 150 feet. The earth embankment slopes are approximately 3H:1V, both upstream and downstream. The riprap facing on both the upstream and downstream earth embankment slopes is well graded and shows no signs of deterioration.
- c. Appurtenant Structures. The gate house is evidently well maintained. The Owner's representative reported that the reservoir drain gate valve is functional, but he was unable to operate it during the inspection because he did not have the gate valve hoist wheel.  
  
The drop spillway appears to be in good condition and shows no sign of horizontal or vertical misalignment. The spillway of the original structure has been replaced.
- d. Reservoir. Reconnaissance of the reservoir disclosed no evidence of siltation, slope instability, or other features that would affect the storage capacity of the reservoir.  
  
The slopes on the perimeter of the reservoir are well vegetated, a good percentage of which are well maintained lawns.
- e. Downstream Channel. Lower Lake is located immediately downstream of Hemlock Lake, and has a surface area of 23 acres at a normal pool elevation approximately 7 feet below that of Hemlock Lake. The channel immediately downstream of the Lower Lake Dam is poorly defined, with swampy overbank areas. From about 500 yards downstream of Lower Lake to Blue Heron Lake, the stream is on a grade in excess of 4 percent. Blue Heron Lake Dam impounds a 90 acre reservoir. The dam is provided with two concrete spillways and a low level outlet. (See photo on page 6 of Appendix D). Approximately 50 houses are located along the shore line of Blue Heron Lake.

## SECTION 4

### OPERATIONAL FEATURES

#### **4.1 Procedures**

Operational procedures have been covered in Section 1.2.h. The Hemlock Farms Community Organization (HFCO), the group responsible for the operation and maintenance of the structure, does not have written operating procedures.

#### **4.2 Maintenance of the Dam**

According to the Owner's representative, normal maintenance consists of keeping the drop spillway free of debris, keeping vegetation cut on the dam, and being alert for any deterioration of the structure.

#### **4.3 Maintenance of Operating Facilities**

According to the Owner's representative, the gate valve is maintained by the HFCO. The HFCO does not have written maintenance procedures.

#### **4.4 Warning System in Effect**

There is no formal warning system or procedure established to be followed during periods of heavy precipitation. A representative of HFCO should be in the vicinity and available to warn residents of impending high flows.

#### **4.5 Evaluation of Operational Adequacy**

Based on the overall appearance of the dam and facilities, the maintenance procedures appear satisfactory for Hemlock Farms Dam.

The Owner's representative reported that the reservoir drain gate valve works, but he did not have the gate valve hoist wheel during the field investigation. It is recommended that the Owner assess the functional condition of the reservoir drain gate valve and exercise the valve periodically.

A formal warning system should be implemented because of the possibility of loss of life and significant property damage downstream in the event of a failure of the structure.

The dam is accessible under all weather conditions for inspection and emergency action.

## SECTION 5

### HYDRAULICS AND HYDROLOGY

#### 5.1 Evaluation of Features

- a. Design Data. The original design information is limited to statements in the Application Report dated September 12, 1928.

The drainage basin contributing to Hemlock Lake Dam is about 2 miles long and averages about 0.6 miles wide, with a total drainage area of 1.18 square miles. Ground elevations range from 1600 to 1439. The average slope of the drainage basin adjacent to the reservoir is about 10 percent. The drainage basin is 100 percent within the Hemlock Farms development. The runoff characteristics of the drainage basin should remain essentially the same in the future because the basin has been fully developed.

For further information refer to the computations, data, and printouts included in Appendix C.

- b. Experience Data. Rainfall and water level records are not kept for this dam. The owners representative said that in the June, 1972, Agnes storm the water surface was about 18 inches above the drop spillway crest (Elevation 1440.5).
- c. Visual Observations. On the day of the inspection, no adverse hydraulic features were observed that would prevent the drop spillway from operating in a satisfactory manner in the event of a severe storm.
- d. Overtopping Potential. The drop spillway has a total discharge capacity of about 800 cfs. before overtopping the dam. However, the Spillway Design Flood (SDF) for this "Intermediate" size dam with a "High" hazard classification is the PMF which has a peak inflow of 2890 cfs. and a peak outflow of 1860 cfs. The PMF hydrograph was routed through the reservoir with the starting water surface at Elevation 1439.0. The maximum water surface elevation in the reservoir from the PMF routing would be 3.8 feet above the drop spillway crest and 0.8 foot above the top of the dam. Examination of the results of the hydrologic and hydraulic analysis indicates that the drop spillway is capable of passing 67 percent of the PMF without overtopping of the embankment (see Appendix C for computations).
- e. Spillway Adequacy. The drop spillway is classified as "Inadequate" because it is capable of passing 67 percent of the PMF. It is not "Seriously Inadequate" because it passes more than 50 percent of the PMF.

## SECTION 6

### STRUCTURAL STABILITY

#### 6.1 Evaluation of Structural Stability

- a. Visual Observations. Due to use as a golf course fairway, the dam is many times wider than shown on the plans and appears stable. Nothing observed during the field inspection would lead one to change that general impression. There were no signs of settlement, surface irregularity or seepage through the embankment or foundation.

The overall appearance of the drop spillway is also good with no visible signs of structural deficiencies or deterioration.

- b. Design and Construction Data. The material provided by DER was reviewed. A listing of this data is included in Appendix A and is discussed in Section 2.
- c. Operating Records. According to the owner's representative, there are no operating records maintained for this structure.
- d. Post - Construction Changes. The spillway of the original structure has been replaced, but no details of this work are available (refer to Section 1.2.g).

The earth embankment is at least seven times wider than the embankment shown on the 1930 drawings. It has been widened to create a golf course fairway.

- e. Seismic Stability. The dam is located in Seismic Zone 1 on the Seismic Zone Map of Contiguous States. A dam located in Seismic Zone 1 is generally considered to be safe under any expected Zone 1 earthquake loading conditions if it is safe under static loading conditions.

## SECTION 7

### ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

#### 7.1 Dam Assessment

- a. Safety. The visual inspection, review of the material furnished by DER, and conversations, with the owner's representative provided sufficient evidence that the dam and the appurtenant structures of the Hemlock Lakes Reservoir are in good condition. The hydrologic and hydraulic calculations presented in Appendix C show that the drop spillway will pass 59 percent of the PMF. Therefore, the drop spillway system of the structure is considered to be "Inadequate".
- b. Adequacy of information. Refer to item 2.4.b.
- c. Urgency. The remedial measures recommended in Section 7.2 should be effected as soon as possible.
- d. Necessity for Further Evaluation. No further investigations are recommended at this time.

#### 7.2 Recommendations and Proposed Remedial Measures

##### a. Facilities.

1. Small trees on the upstream and downstream slopes of the earth embankment should be cut at ground level.
2. Small animal burrows on the earth embankment should be filled with suitable material.
3. The operating condition of the reservoir drain gate valve should be assessed and the valve should be operated periodically.

##### b. Operation and Maintenance Procedures.

1. A warning system should be developed. During periods of heavy rainfall, the dam should be monitored and downstream residents alerted in the event of an impending failure.

**APPENDIX**

**A**

**Check List Engineering Data  
Design, Construction, Operation**

**Phase I**

# Hemlock Lake

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

NAME OF DAM  
ID # PA 00399

## ITEM

### AS-BUILT DRAWINGS

### REMARKS

There are no "As-Built" drawings, but DER files have 8 sheets of drawings of limited value.

### REGIONAL VICINITY MAP

See Plate 1, Appendix E. Blawervelt & Horrie Engineers 250 provided a regional location plan for the dam.

### CONSTRUCTION HISTORY

Construction project reports prepared by engineers of the Water & Power Resources Board of the state of Pennsylvania are in the DER files.

### TYPICAL SECTIONS OF DAM

Refer to Appendix E for drawing

|                            |         |                                  |
|----------------------------|---------|----------------------------------|
| OUTLETS - PLAN             | DETAILS | Refer to Appendix E for drawings |
| CONSTRAINTS                |         |                                  |
| DISCHARGE RATINGS          |         | None available                   |
| RAINFALL/RESERVOIR RECORDS |         | None available                   |

Sheet 1 of 4

| ITEM  | REMARKS  |
|---|--|
| DESIGN REPORTS  | No design data available . 8 sheets of drawings of limited value in DER files.   |
| GEOLOGY REPORTS   | None provided in DER files. Refer to Appendix F of this report.                  |
| DESIGN COMPUTATIONS<br>HYDROLOGY & HYDRAULICS<br>DAM STABILITY<br>SEEPAGE STUDIES | No data available<br>No data available<br>No data available<br>No data available |
| MATERIALS INVESTIGATIONS<br>BORING RECORDS<br>LABORATORY }<br>FIELD }             | 3 boring profiles shown in drawings.   |
| POST-CONSTRUCTION SURVEYS OF DAM  | None   |
| BORROW SOURCES  | There is no record of where borrow material comes from                           |

## Sheet 3 of 4

| ITEM  | REMARKS   |
|---|---|
| MONITORING SYSTEMS                                    | None  |
| MODIFICATIONS   | The embankment has been widened to at least seven times its original width. Minimum top width is now about 150 feet. The drop spillway has been completely rebuilt and relocated. There are no plans available for the present drop spillway. |
| HIGH POOL RECORDS                                     | None. A representative of the HFCO said the highest known stage in the lake was in June 1972 when the water was about 13 inches above the crest of the dam spillway. (Elevation 1141.5)   |
| POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS     | None  |
| PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS | None  |
| MAINTENANCE OPERATION RECORDS                         | Records were not made available to us. The structure, however, is kept in good maintenance.   |

| ITEM                                      | REMARKS  |
|---|--|
| SPILLWAY PLANS<br>SECTIONS }<br>DETAILS } | See Appendix E for details.  |
| OPERATING EQUIPMENT<br>PLANS & DETAILS    | See Appendix E for details.  |
| MISCELLANEOUS                             | <p>Material in DER files</p> <ol style="list-style-type: none"> <li>1. "Application" to construct Hemlock Lake Dam, August 23, 1928</li> <li>2. Report upon the application of W. C. Brewster "was prepared on Sept. 12, 1928 by the State of Pennsylvania, Water &amp; Power Resources</li> <li>3. "Permit" to construct Hemlock Lake Dam, issued Sept. 26, 1928.</li> <li>4. "Construction Progress Reports" prepared by Water &amp; Power Resources by State of Pennsylvania.</li> <li>5. Dam inspection reports through the years</li> <li>6. Photographs made during construction and through the intervening years.</li> </ol> |

**APPENDIX**

**B**

**Check List**

**Visual Inspection**

**Phase I**

CHECK LIST  
VISUAL INSPECTION  
PHASE I

SHEET 1 OF 11

Name Dam Hemlock Lake County Dike State Pennsylvania National ID # 00599  
Type of Dam Compacted Earth Fill Hazard Category - High  
Date(s) Inspection Nov. 21/422 Weather Cold, Cloudy Temperature 30 ° 35 ° F

Pool Elevation at Time of Inspection ± 439.0 M.S.L. Tailwater at Time of Inspection ± 431.0 M.S.L.

Inspection Personnel:

Howard Beck Robert Bowes David Campbell

Leonard Beck Recorder

Remarks:

David Kochel of the Hemlock Farms Community Organization (HFCD) showed up during our inspection

## CONCRETE/MASONRY DAMS

Sheet 2 of 11

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--------------|----------------------------|
|-----------------------|--------------|----------------------------|

ANY NOTICEABLE SEEPAGE

N/A

STRUCTURE TO  
ABUTMENT/EMBANKMENT  
JUNCTIONS

N/A

DRAINS

N/A

WATER PASSAGES

N/A

FOUNDATION

N/A

CONCRETE/MASONRY DAMS

Sheet 3 of 11

| VISUAL EXAMINATION OF                | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--------------------------------------|--------------|----------------------------|
| SURFACE CRACKS<br>CONCRETE SURFACES  | N/A          |                            |
| STRUCTURAL CRACKING                  | N/A          |                            |
| VERTICAL AND HORIZONTAL<br>ALIGNMENT | N/A          |                            |
| MOROLITH JOINTS                      | N/A          |                            |
| CONSTRUCTION JOINTS                  | N/A          |                            |

| VISUAL EXAMINATION OF<br>EMBANKMENT                          |                            |                            |
|--|----------------------------|----------------------------|
|  | OBSERVATIONS               | REMARKS OR RECOMMENDATIONS |
| SURFACE CRACKS   | None observed              | None                       |
| UNUSUAL MOVEMENT OR<br>CRACKING AT OR BEYOND<br>THE TOE      | None observed              | None                       |
| SLoughing or Erosion of<br>embankment and abutment<br>slopes | None observed              | None                       |
| Vertical and horizontal<br>alignment of the crest            | No distortions<br>observed | None                       |
| RIPRAP FAILURES  | None observed              | None                       |

EMBANKMENT

Sheet 5 of 11  
VISUAL EXAMINATION OF  
OBSERVATIONS  
REMARKS OR RECOMMENDATIONS

DRAINS                  None observed                  None

JUNCTION OF EMBANKMENT  
AND ABUTMENT, SPILLWAY  
AND DAM  
No discontinuities observed  
impossible to tell where 30%  
bank wash begins & dam ends  
None

ANY NOTICEABLE SEEPAGE  
None observed  
None

STAFF GAGE AND RECORDER  
None  
None

OUTLET WORKS

| <u>VISUAL EXAMINATION OF</u>                                       | <u>OBSERVATIONS</u>  | <u>REMARKS OR RECOMMENDATIONS</u>             |
|--|--|---|
| CRACKING AND SPALLING OF<br>CONCRETE SURFACES IN<br>OUTLET CONDUIT | None observed  | None  |
| INTAKE STRUCTURE   | Under water at time<br>of investigation                        | Trash rack<br>protection shown<br>on drawings |
| OUTLET STRUCTURE   | Under water at time<br>of investigation                        | None  |
| OUTLET CHANNEL   | No outlet channel.<br>Outlet flows directly<br>into lower lake | None  |
| EMERGENCY GATE<br>BRIDGE   | N/A  | N/A   |

UNGATED SPILLWAY

Sheet 7 of 11

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

CONCRETE WEIR

Good condition

None

No spotting  
No obstructions

APPROACH CHANNEL

Good condition

Stone masonry  
& concrete walls

None

DISCHARGE CHANNEL

No obstructions, very

short average 30 feet long  
discharges into lower lake

None

BRIDGE AND PIERS

N/A

GATED SPILLWAY

Sheet 8 of 11

VISUAL EXAMINATION OF

CONCRETE STILL

OBSERVATIONS

N/A

REMARKS OR RECOMMENDATIONS

APPROACH CHANNEL

N/A

DISCHARGE CHANNEL

N/A

BRIDGE AND PIERS

N/A

GATES AND OPERATION  
EQUIPMENT

N/A

INSTRUMENTATION

| Sheet 9 of 11             |                     |                                   |
|---------------------------|---------------------|-----------------------------------|
| <u>VISUAL EXAMINATION</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
| MONUMENTATION/SURVEYS     | None                | None                              |
| OBSERVATION WELLS         | None                | None                              |
| WEIRS                     | None                | None                              |
| PIEZOMETERS               | None                | None                              |
| OTHER                     | None                | None                              |

RESERVOIR

VISUAL EXAMINATION OF  
REMARKS OR RECOMMENDATIONS

| <u>OBSERVATIONS</u>  |   |
|--|---|
| SLOPES<br>Gentle to moderate,<br>Well vegetated, no<br>signs of slides | <u>None</u>   |
| SEDIMENTATION  | Accumulation has not been<br>enough to adversely affect<br>any of the recreation areas<br>of the impoundment. |

Sheet 10 of 11

## DOWNSTREAM CHANNEL

Sheet 11 of 11

| VISUAL EXAMINATION OF<br>CONDITION<br>(OBSTRUCTIONS,<br>DEBRIS, ETC.)   | OBSERVATIONS  | REMARKS OR RECOMMENDATIONS   |
|---|---|--|
| IMMEDIATELY downstream is lower lake. The spillway for Lower Lake has a high rock with small openings which will probably plug with high flows. | Downstream of lower lake, the channel follows through a swamp, then a steep reach & around a bay before emptying into Blue Heron Lake.                            | Remove the high rock on the lower lake spillway  |
| SLOPES  | Taken drop from top of transverse cut to lower lake. Taken slope through swamp downstream of lower lake, then about 4% slope to swamp upstream of Blue Heron Lake | None   |
| APPROXIMATE NO.<br>OF HOMES AND<br>POPULATION   | 50 houses and approximately<br>250 people   | A formal warning system should be developed and implemented. Providing for evacuation of people within the flood region of Blue Heron Lake should be undertaken. |

**APPENDIX**

**C**

**Hydrologic & Hydraulic Data**



O'BRIEN & GERE  
ENGINEERS, INC.

SUBJECT

Hemlock Lake Dam

SHEET

BY

DATE

JOB NO

## Table of Contents APPENDIX C

### Hydrologic & Hydraulic Data

|   |               |
|---|---------------|
| PMP Calculations                            | Sheet 1       |
| Synder Coefficients                         | " 1           |
| Hemlock Lake, stage vs. Storage             | " 2           |
| Hemlock Lake, stage vs. Discharge           | " 3           |
| HEC-I Dam Safety Version, Computer Printout | " 4<br>thru 8 |



|                  |  |       |     |         |         |
|------------------|--|-------|-----|---------|---------|
| SUBJECT          |  | SHEET | BY  | DATE    | JOB NO. |
| HEMLOCK LAKE DAM |  | 1     | RRB | 1/12/79 |         |

✓ 1/25/79

HEC 2, DAM SAFETY VERSION PROGRAM CALCULATIONS

DRAINAGE AREA: 1.18 SQUARE MILES

PMP CALCULATIONS (HMS REPORT 33)

AREA IS IN ZONE 2 OF PMP ALL SEASON ENVELOPE (FIG. 3)

24 HR., 200 SQ.MI. RAINFALL  $\approx$  21"

| HR. | %   | RAINFALL | ΔRF    |
|-----|-----|----------|--------|
| 6   | 111 | 23.3 "   | 23.3 " |
| 12  | 123 | 25.8 "   | 2.5 "  |
| 24  | 133 | 27.9 "   | 2.1 "  |

SNYDER COEFFICIENTS

FROM INFO. PROVIDED BY COE, (ZONE 1)

$$C_p = 0.45$$

AND  $C_t = 1.23$

$$t_p = C_t (L \cdot L_{ca})^{0.3}$$

$L = 1.70$  miles

$L_{ca} \approx 0.6$  miles

$$t_p = 1.23 (1.7 \cdot 0.6)^{0.3} = 1.24 \text{ HR.}$$

SUBJECT

Hornlock Lake Dam, Stage vs. Storage

SHEET

2

BY

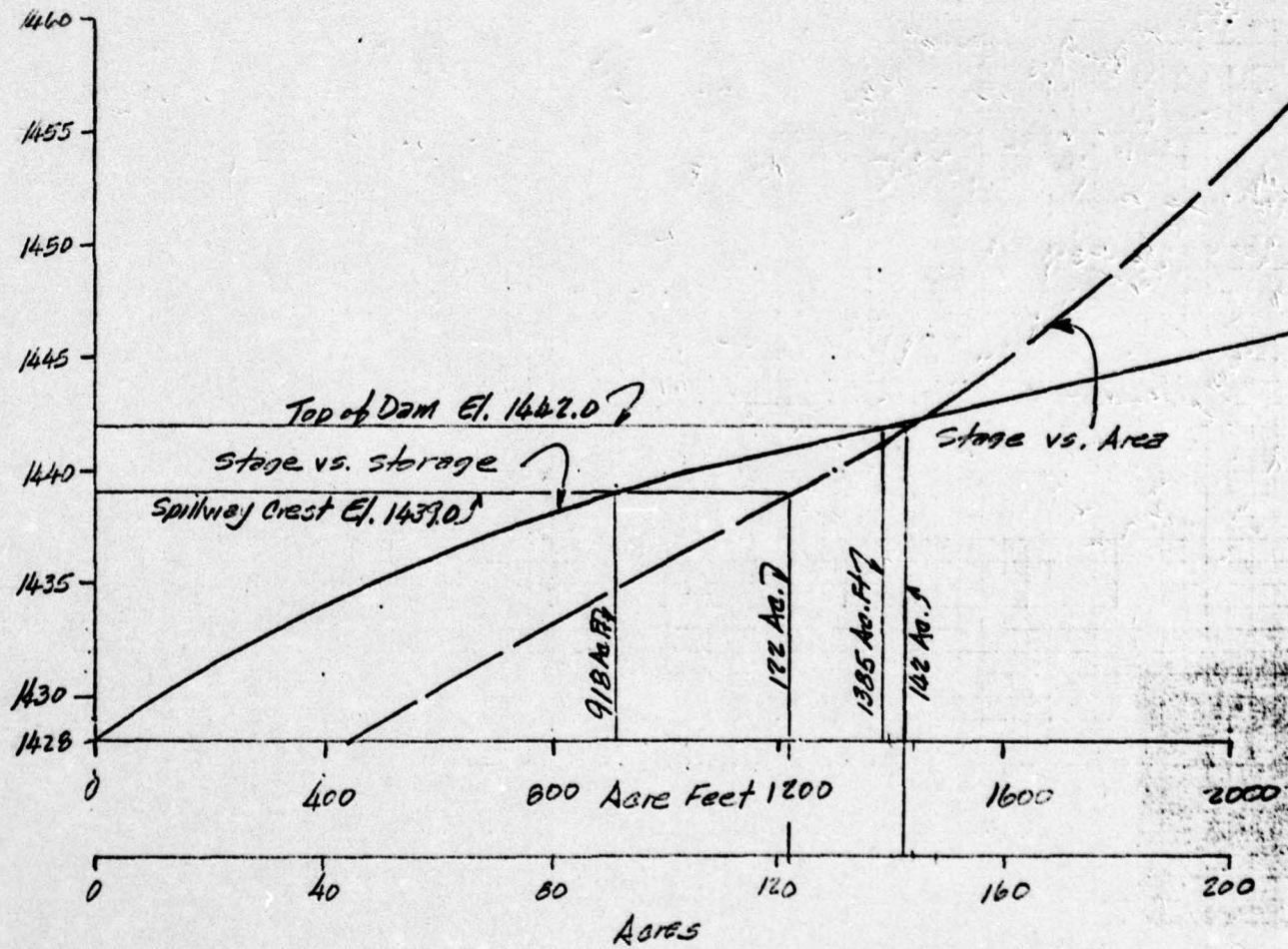
DATE

12/11/75

JOB NO

52-71

| Elev. (ft.)<br>(Bottom of Lake) | Area (in $\text{ft}^2$ )<br>Firm Dred. Sh. | Area (Acres; @ 91.827) | Dif. Elev. (ft.) | Vol. (A.F.) | Vol. (A... |
|---------------------------------|--|------------------------|------------------|-------------|------------|
| 1428.0                          | —  | 45 (Assumed)           |                  |             |            |
| 1439.0                          | 1.33                                       | 122                    | 11               | 918         | 918        |
| 1440.0                          | 1.42                                       | 130                    | 1                | 126         | 1044       |
| 1460.0                          | 2.45                                       | 225                    | 20               | 3550        | 4594       |



|    |  |                   |                |                         |                        |
|----|--|-------------------|----------------|-------------------------|------------------------|
| SU | Herzlika Lake Dam, Stage vs. Discharge | SHEET<br><b>3</b> | BY<br><b>E</b> | DATE<br><b>12/12/78</b> | JOB NO<br><b>52-71</b> |
|----|--|-------------------|----------------|-------------------------|------------------------|



El. ~1439.0

Section of Weir  
of Spwy.

A weir flow coefficient of 3.3 will be used.  
This value was arrived at after referring to:  
SCS NEH-5, Krueger Hydraulic Handbook, & consulting  
with fellow staff members of O&G.  
rounded, 47' long,  $CL = 3.3 \times 47 = 155.1$

| Elev.  | CL    | h   | $h^{3/2}$ | Q              |
|--------|-------|-----|-----------|----------------|
| 1439.0 | 155.1 | 0   | 0         | 0              |
| 1439.5 | "     | 0.5 | 0.354     | 55             |
| 1440.0 | "     | 1.0 | 1.0       | 155            |
| 1441.0 | "     | 2.0 | 2.83      | 439            |
| 1442.0 | "     | 3.0 | 5.20      | 807 Top of Dam |



FLOOD HYDROGRAPH PACKAGE (NEC-1)  
DAM SAFETY VERSION  
LAST MODIFICATION 25 SEP 78

RUN DATE 06/07/79.  
TIME 07:38:16.

NATIONAL DAM INSPECTION PROGRAM  
HENLOCK LAKE DAM  
PMF HYDROGRAPH

| NO  | NHHR | NMIN | IDAY | JHR | IMIN  | METRC | JPLT | IPRT | NSTAN |
|-----|------|------|------|-----|-------|-------|------|------|-------|
| 150 | 0    | 30   | 0    | 0   | 0     | 0     | 0    | -4   | 0     |
|     |      |      |      | NUT | LROPY | TRACE |      |      |       |
|     |      |      |      | 5   | 0     | 0     |      |      |       |

MULTI-PLAN ANALYSES TO BE PERFORMED

| NPPLAN | 1   | NRATIO | 1   | LRATIO | 1   |
|--------|-----|--------|-----|--------|-----|
| RTIOS  | .20 | .30    | .40 | .50    | .60 |
|        |     |        |     |        | .70 |

\*\*\*\*\*  
SUB-AREA RUNOFF COMPUTATION

RUNOFF TO RESERVOIR

| ISTAO | ICOMP | IECON | ITAPE | JPLT | JPRT | I NAME | I START | I AUTO |
|-------|-------|-------|-------|------|------|--------|---------|--------|
| A1    | 0     | 0     | 0     | 0    | 0    | 1      | 0       | 0      |

| IMVOD | TUMG | TAREA | SNAP | HYDROGRAPH DATA | TRSPC | RATIO | ISNOW | I NAME | LOCAL |
|-------|------|-------|------|-----------------|-------|-------|-------|--------|-------|
| 1     | 1    | 1.20  | 0.00 | 1.20            | 0.00  | 0.000 | 0     | 1      | 0     |

| SPFE | PMS   | R6     | R12    | R24    | R48  | R72  | R96  |  |
|------|-------|--------|--------|--------|------|------|------|--|
| 0.00 | 21.00 | 111.00 | 123.00 | 133.00 | 0.00 | 0.00 | 0.00 |  |

TRSPC COMPUTED BY THE PROGRAM IS .800

| LROPY | STAKA | DLTKR | RTOL | ERAIN | LOSS DATA | STR0K | STRTL | CNSTL | ALSMX | ATMP |
|-------|-------|-------|------|-------|-----------|-------|-------|-------|-------|------|
| 0     | 0.00  | 0.00  | 1.00 | 0.00  | 0.00      | 1.00  | 1.00  | .05   | 0.00  | 0.00 |

| YR= | 1.24 | CP= | .45 | NTA= |
|-----|------|-----|-----|------|
|     |      |     |     | 0    |

| STR0= | -1.50 | OPCSV= | -.05 | RTOR= | 2.00 |
|-------|-------|--------|------|-------|------|
|       |       |        |      |       |      |

UNIT HYDROGRAPH 23 END-OF-PERIOD ORDINATES, LAG= 1.24 HOURS, CP=.45 VOL= 1.00  
67. 208. 265. 220. 172. 135. 105. 64. 50.  
39. 31. 24. 19. 15. 11. 9. 7. 5.  
3. 3. 2. 3.

END-OF-PERIOD FLOW

NO.DA HR.MN PERIOD RAIN EXCS LOSS COMP 0 40.DA HR.MN PERIOD PAIN EXCS LOSS COMP 0

SUM 22.34 20.49 1.85 33214.  
1.566.1 1.521.1L 07.1L 949.521

Sheet 6

HYDROGRAPH ROUTING

ROUTING THROUGH RESERVOIR

| 1STAO           | TCOMP   | 1ECON   | 1TAPE   | JPLT         | JPT     | INAME    | 1STAGE | IAUTO  |
|-----------------|---------|---------|---------|--------------|---------|----------|--------|--------|
| A2              | 1       | 0       | 0       | 0            | 0       |          | 0      | 0      |
| GLOSS           | CLOSS   | AVG     | 1RES    | ROUTING DATA | 10PT    | TPMP     |        | LSTR   |
| 0.0             | 0.000   | 0.00    | 1       | 1            | 0       | 0        |        | 0      |
| NSTPS           | NSTOL   | LAG     | ANSKX   | X            | X       | TSK      | STORA  | ISPRAT |
| 1               | 0       | 0       | 0.000   | 0.000        | 0.000   | -1439.   | -1439. | -1     |
| STAGE           | 1439.00 | 1439.50 | 1440.00 | 1441.00      | 1442.00 |          |        |        |
| FLOW            | 0.00    | 55.00   | 155.00  | 439.00       | 807.00  |          |        |        |
| CAPACITY        | 0.      | 918.    | 1044.   | 4594.        |         |          |        |        |
| ELEVATION       | 1428.   | 1439.   | 1440.   | 1460.        |         |          |        |        |
|                 | CREL    | SPMID   | COOM    | EXPN         | ELEV    | COOL     | CAREA  | EXPL   |
|                 | 1439.0  | 0.0     | 0.0     | 0.0          | 0.0     | 0.0      | 0.0    | 0.0    |
|                 |         |         |         |              | TOPEL   | DAM DATA |        |        |
|                 |         |         |         |              | 1442.0  | COOD     | EXPO   | DAMID  |
|                 |         |         |         |              | 2.6     | 1.5      | 450.   |        |
| PEAK OUTFLOW IS | 207.    | AT TIME | 20.50   | HOURS        |         |          |        |        |
| PEAK OUTFLOW IS | 323.    | AT TIME | 20.00   | HOURS        |         |          |        |        |
| PEAK OUTFLOW IS | 439.    | AT TIME | 20.00   | HOURS        |         |          |        |        |
| PEAK OUTFLOW IS | 598.    | AT TIME | 20.00   | HOURS        |         |          |        |        |
| PEAK OUTFLOW IS | 723.    | AT TIME | 20.00   | HOURS        |         |          |        |        |
| PEAK OUTFLOW IS | 968.    | AT TIME | 20.00   | HOURS        |         |          |        |        |
| PEAK OUTFLOW IS | 1210.   | AT TIME | 19.50   | HOURS        |         |          |        |        |
| PEAK OUTFLOW IS | 1520.   | AT TIME | 19.50   | HOURS        |         |          |        |        |
| PEAK OUTFLOW IS | 1662.   | AT TIME | 19.00   | HOURS        |         |          |        |        |

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

Sheet 7

| OPERATION     | STATION | AREA          | PLAN             | RATIOS APPLIED TO FLOWS |                 |                  |                  |                  |                  |                  |                  |
|---------------|---------|---------------|------------------|-------------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
|               |         |               |                  | RATIO 1                 | RATIO 2         | RATIO 3          | RATIO 4          | RATIO 5          | RATIO 6          | RATIO 7          | RATIO 8          |
|               |         |               |                  | .20                     | .30             | .40              | .50              | .60              | .70              | .80              | .90              |
| HYDROGRAPH AT | A1      | 1.20<br>3.111 | 1<br>( 16.39 ) ( | 579.<br>26.58 (         | 868.<br>32.77 ( | 1157.<br>40.97 ( | 1447.<br>49.16 ( | 1736.<br>57.35 ( | 2025.<br>65.55 ( | 2315.<br>73.74 ( | 2604.<br>81.93 ( |
| ROUTE TO      | A2      | 1.20<br>3.111 | 1<br>( 5.86 ) (  | 207.<br>9.15 (          | 323.<br>12.43 ( | 439.<br>16.96 (  | 590.<br>20.48 (  | 723.<br>25.15 (  | 888.<br>34.27 (  | 1210.<br>43.04 ( | 1662.<br>52.74 ( |

**SUMMARY OF DAM SAFETY ANALYSIS**

PLAN 1

| RATIO<br>OF<br>RESERVOIR<br>PHF<br>TO<br>P.H.F. | MAXIMUM<br>DEPTH<br>OVER DAM<br>ft. | MAXIMUM<br>STORAGE<br>AC-FT | SPILLWAY CREST<br>ft. | TOP OF DAM<br>ft. | TIME OF<br>MAX OUTFLOW<br>HOURS | TIME OF<br>FAILURE<br>HOURS |
|---|-------------------------------------|-----------------------------|-----------------------|-------------------|---------------------------------|-----------------------------|
|   |                                     |                             |                       |                   |                                 |                             |
| .25   | 1440.15                             | 0.00                        | 1077.                 | 297.              | 0.00                            | 0.00                        |
| .30   | 1440.55                             | 0.00                        | 1149.                 | 323.              | 0.00                            | 0.00                        |
| .40   | 1441.00                             | 0.00                        | 1221.                 | 439.              | 0.00                            | 0.00                        |
| .50   | 1441.30                             | 0.00                        | 1285.                 | 596.              | 0.00                            | 0.00                        |
| .60   | 1441.70                             | 0.00                        | 1353.                 | 723.              | 0.00                            | 0.00                        |
| .70   | 1442.11                             | 0.00                        | 1419.                 | 886.              | 2.50                            | 20.50                       |
| .80   | 1442.35                             | 0.00                        | 1467.                 | 1219.             | 4.00                            | 19.50                       |
| .90   | 1442.45                             | 0.00                        | 1503.                 | 1520.             | 5.00                            | 19.50                       |
| 1.00  | 1442.75                             | 0.00                        | 1537.                 | 1652.             | 5.50                            | 19.50                       |

**Sheet 8**

**APPENDIX**

**D**

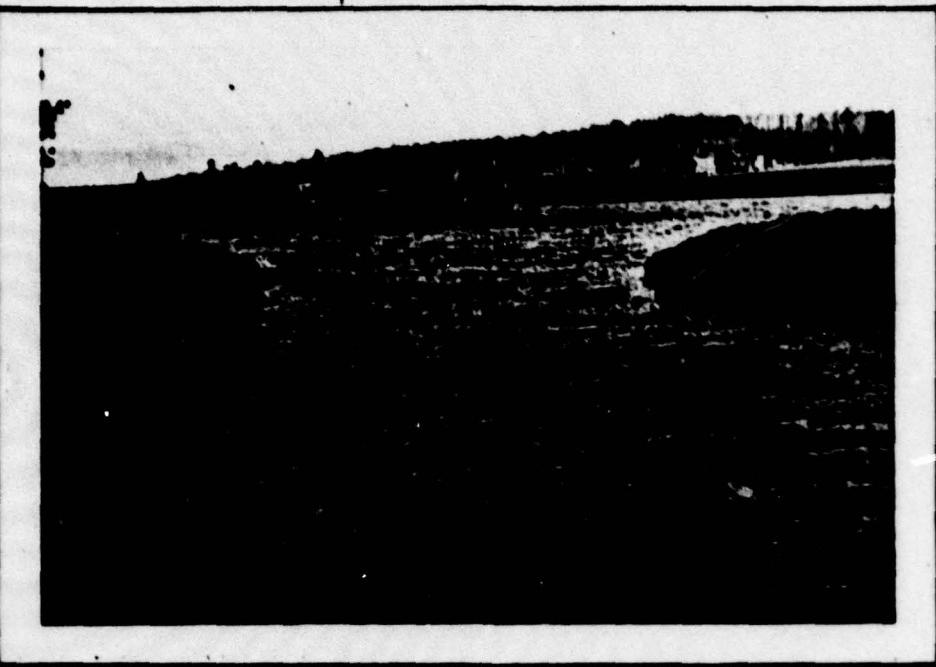
**Photographs**



**VIEW ALONG LENGTH OF DAM WHICH  
IS ACTUALLY A GOLF FAIRWAY**



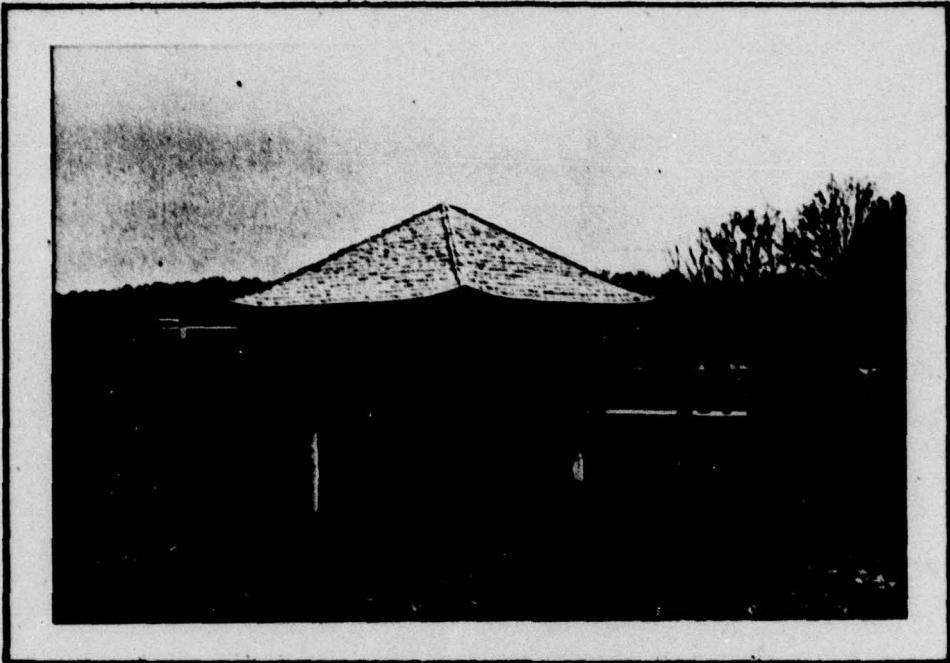
**UPSTREAM FACE OF DAM**



APPROACH CHANNEL TO DROP SPILLWAY



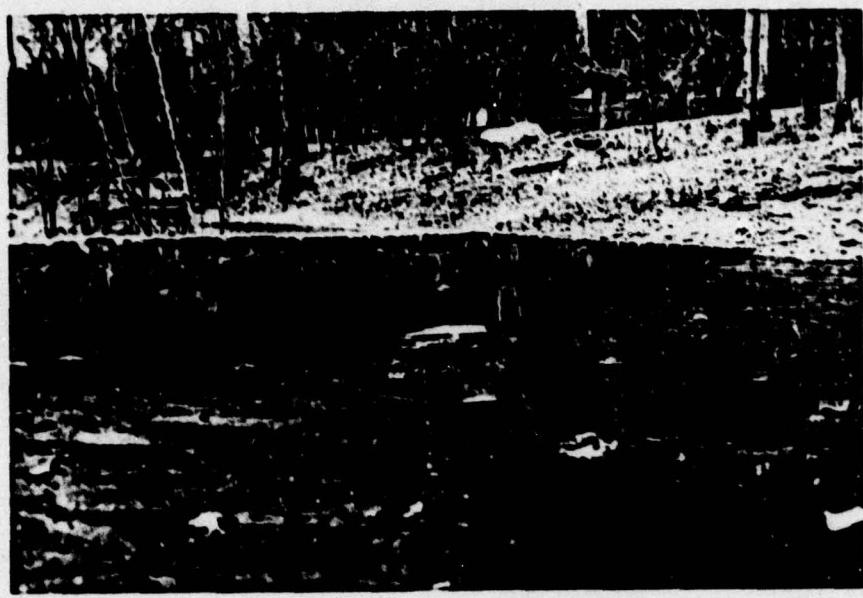
VIEW ACROSS HEADWALL  
OF DROP SPILLWAY



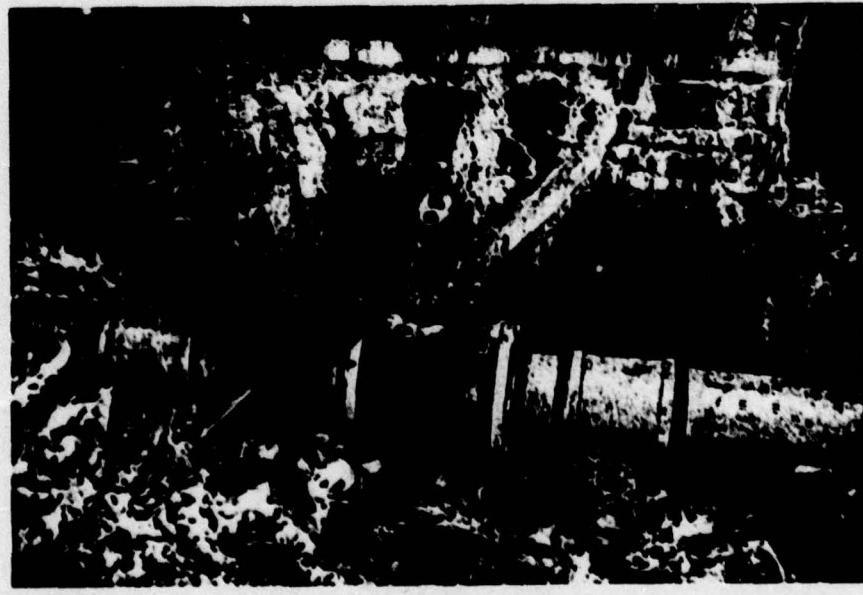
PAGODA SHELTER BUILT ON TOP OF  
RESERVOIR DRAIN GATE VALVE TOWER



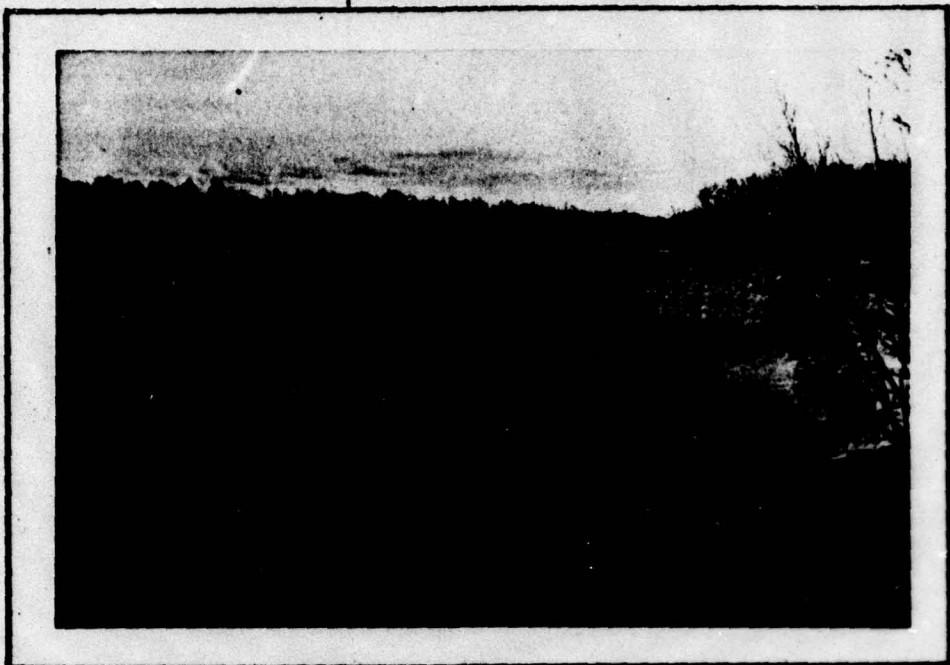
RIPRAPPED RIGHT SIDE OF  
DROP SPILLWAY APRON



DRAIN PIPES THROUGH TRANSVERSE  
SILL OF DROP SPILLWAY



WATER MAIN VALVE NEXT TO HEADWALL  
IN APRON OF DROP SPILLWAY



LOWER LAKE IMMEDIATELY  
DOWNSTREAM OF HEMLOCK LAKE DAM



LOWER LAKE DAM 400 YARDS DOWNSTREAM  
OF HEMLOCK LAKE DAM



BLUE HERON LAKE DAM 2 MILES  
DOWNSTREAM OF HEMLOCK LAKE DAM



DEVELOPMENT ALONG SHORE OF BLUE HERON LAKE  
ABOUT 2 MILES DOWNSTREAM OF HEMLOCK LAKE DAM

**APPENDIX**

**E**

**Drawings**



OBRIEN & GERE

SUBJECT

Hemlock Lake Dam

SHEET

BY

DATE

JOB NO.

## APPENDIX "E" Table of Contents

- Regional Vicinity Map \_\_\_\_\_ Plate 1  
Plan & Elevation of Dam as of 1930 \_\_\_\_\_ Plate 2  
General Plan of Dam, 1978 \_\_\_\_\_ Plate 3  
Profile along Centerline of Dam,  
1978 \_\_\_\_\_ Plate 4  
Location Plan, 1928 \_\_\_\_\_ Plate 5

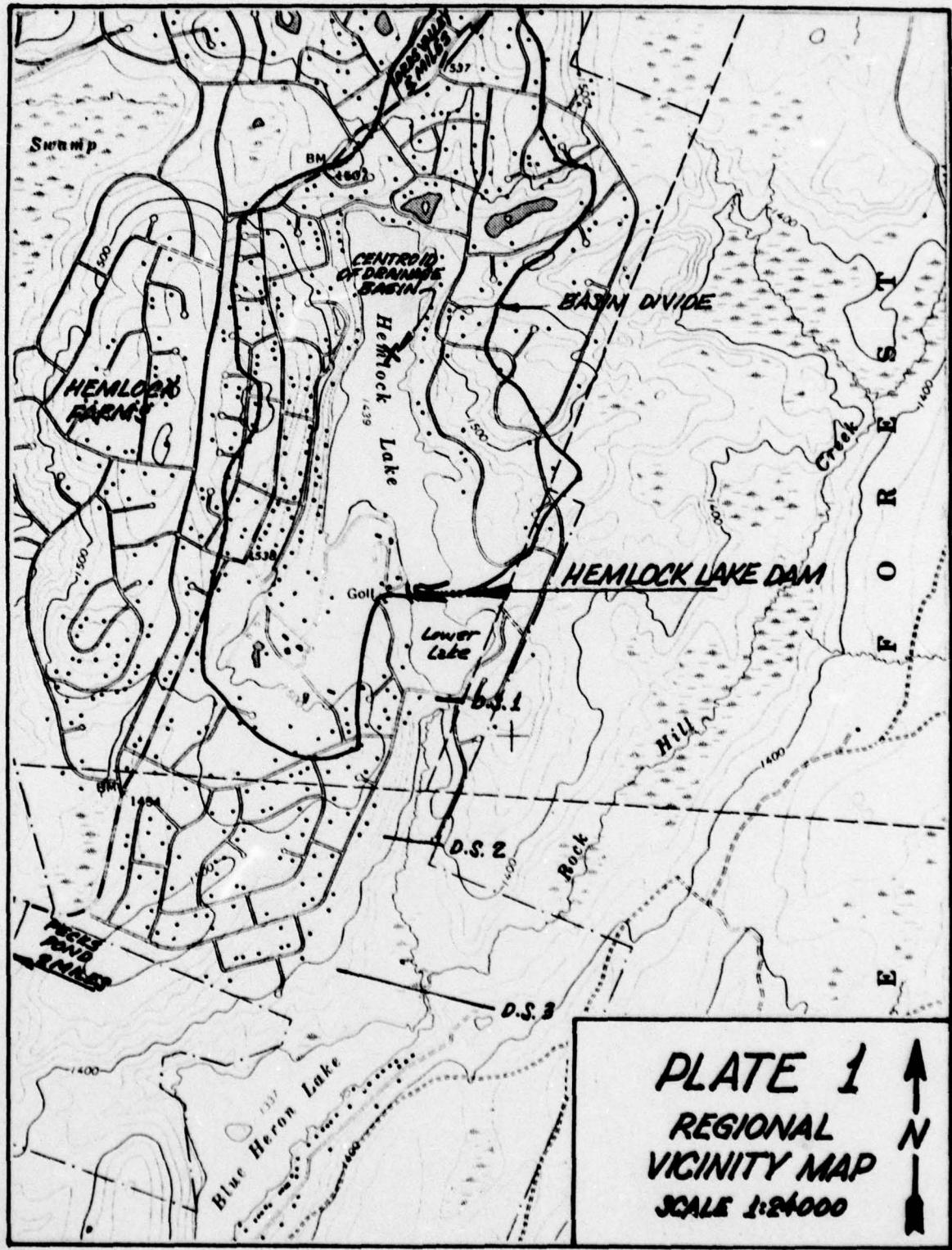
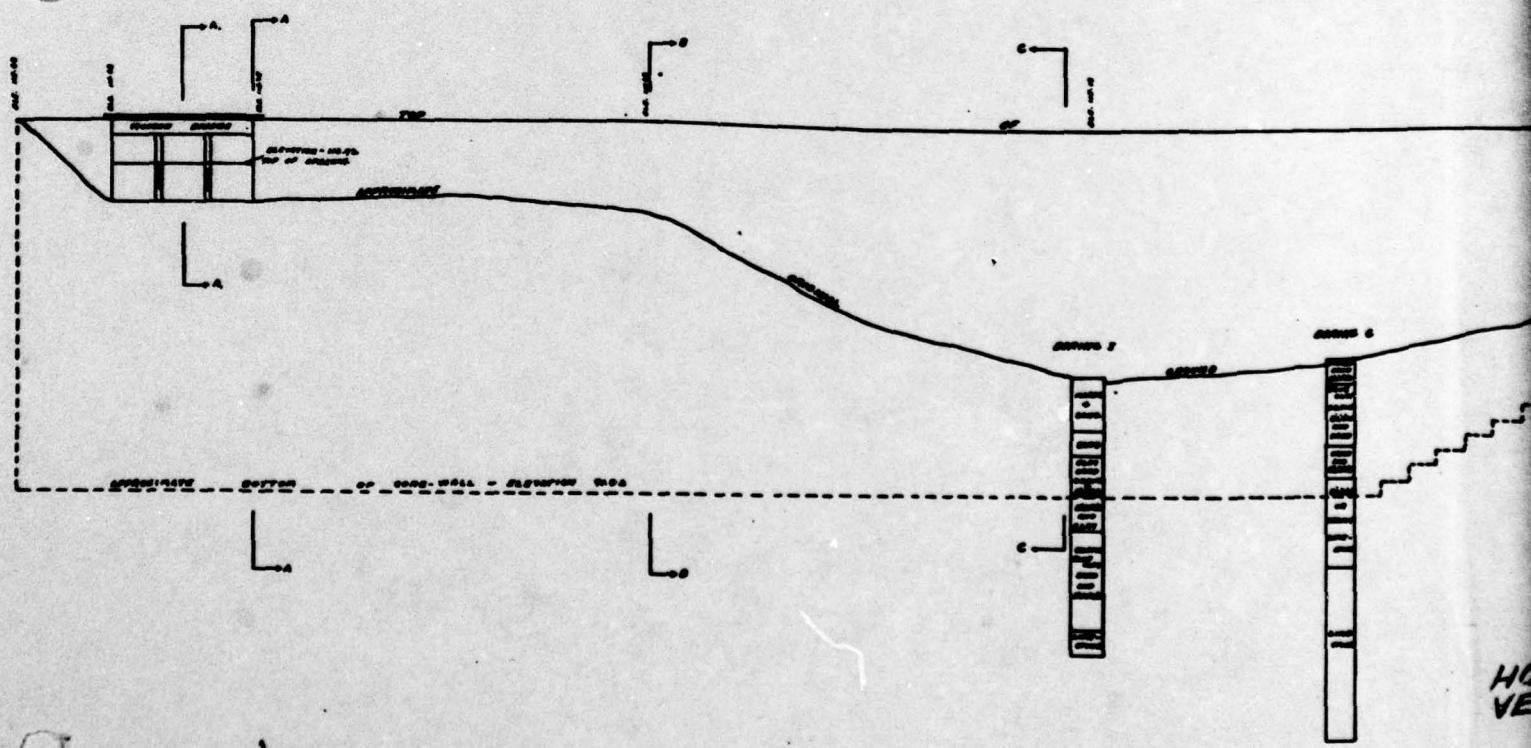
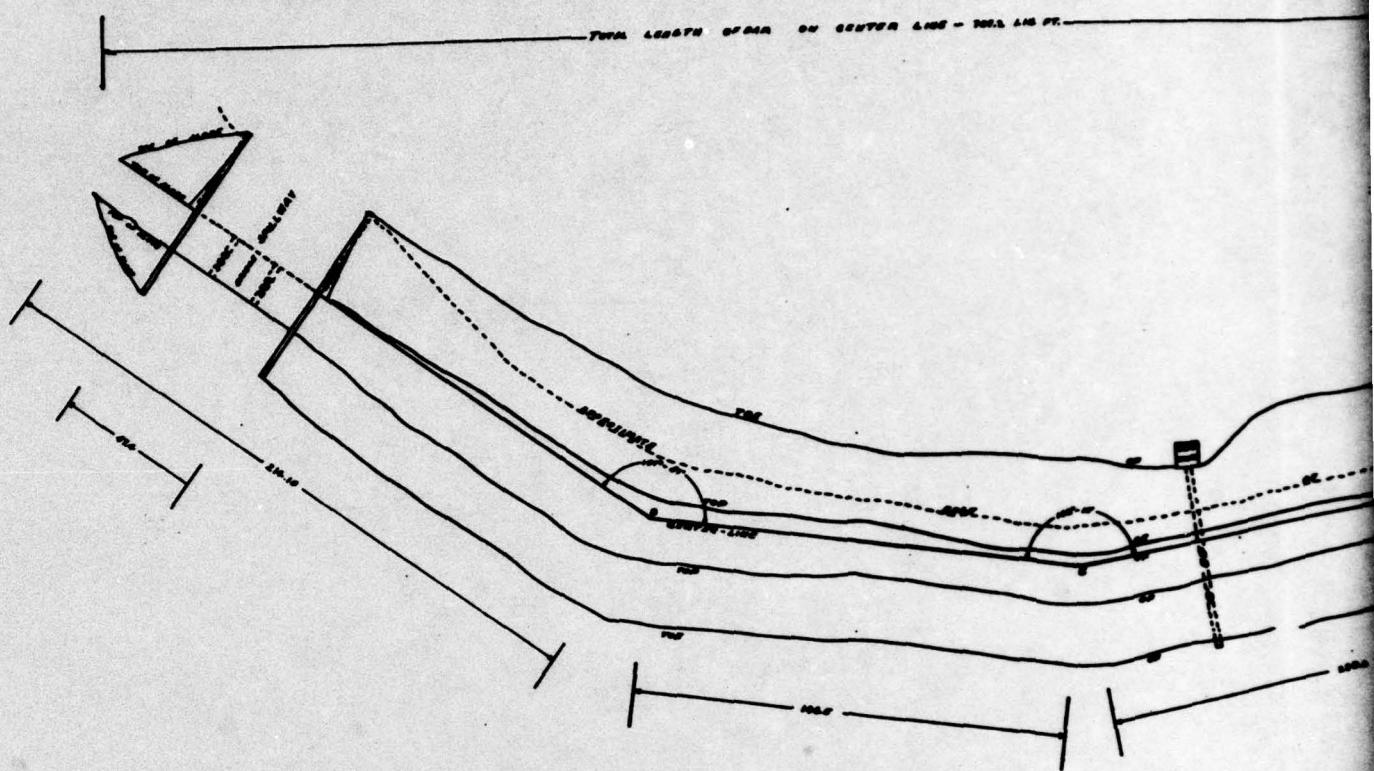
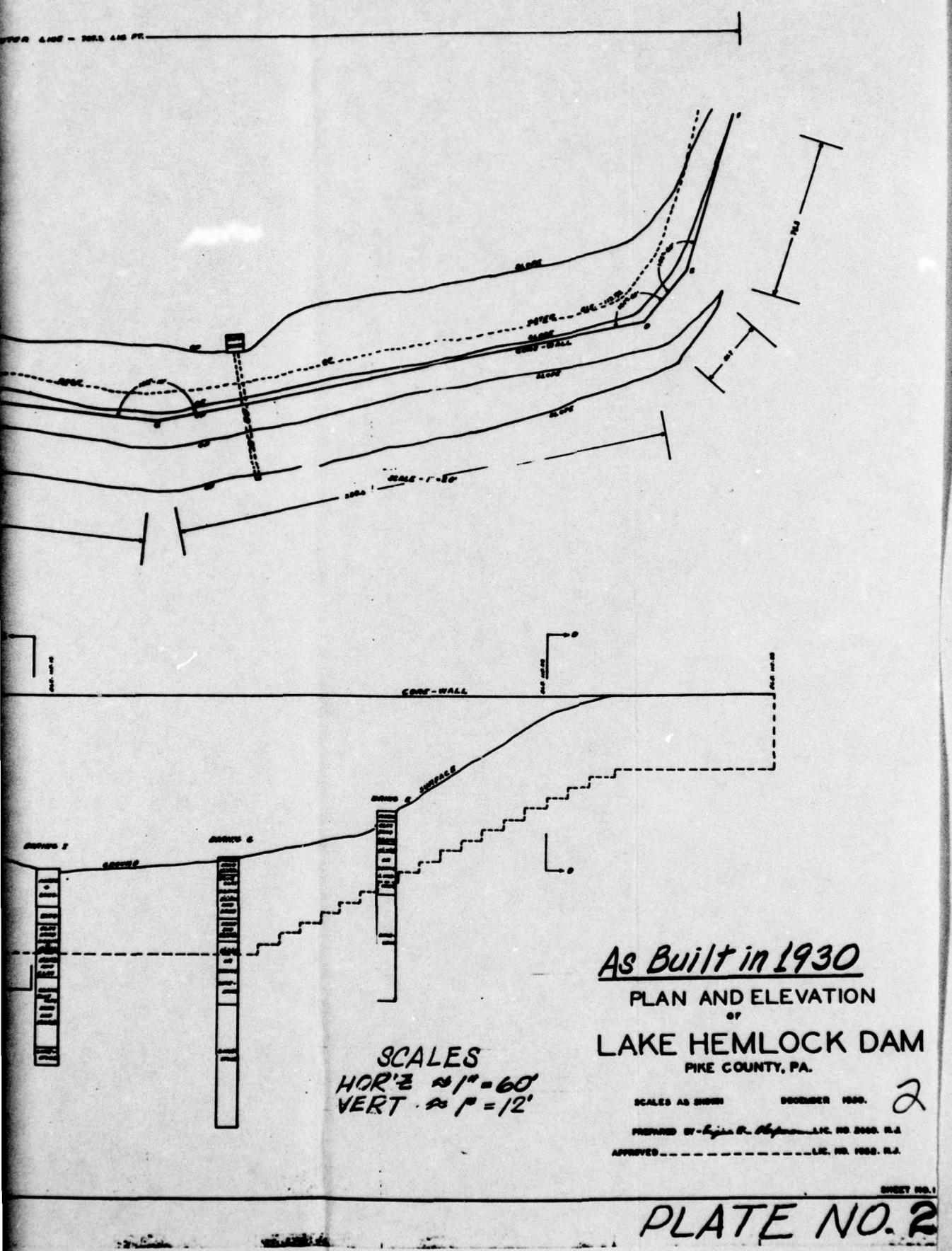


PLATE 1  
REGIONAL  
VICINITY MAP  
SCALE 1:24000







As Built in 1930  
PLAN AND ELEVATION  
*or*  
LAKE HEMLOCK DAM  
PIKE COUNTY, PA.

SCALES  
HOR'Z  $\approx 1'' = 60'$   
VERT  $\approx 1' = 12''$

SEARCHED AND SERIALIZED DECEMBER 1980.

**ANSWER** *Ex-Sister S. Gómez* — NE 10th Street, PA.

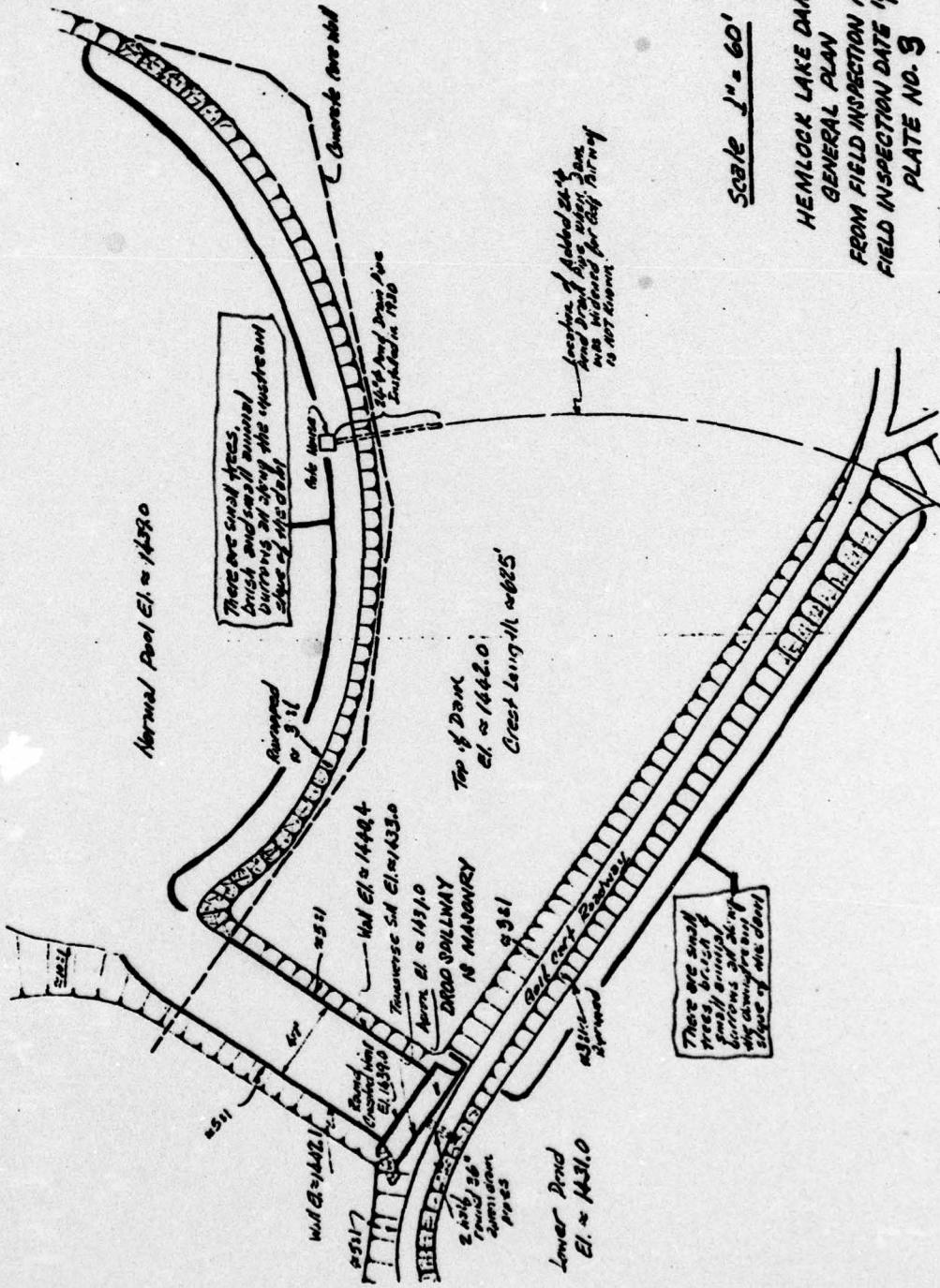
15 NOVEMBER 1994

[View this page online](#)

PLATE NO. 2

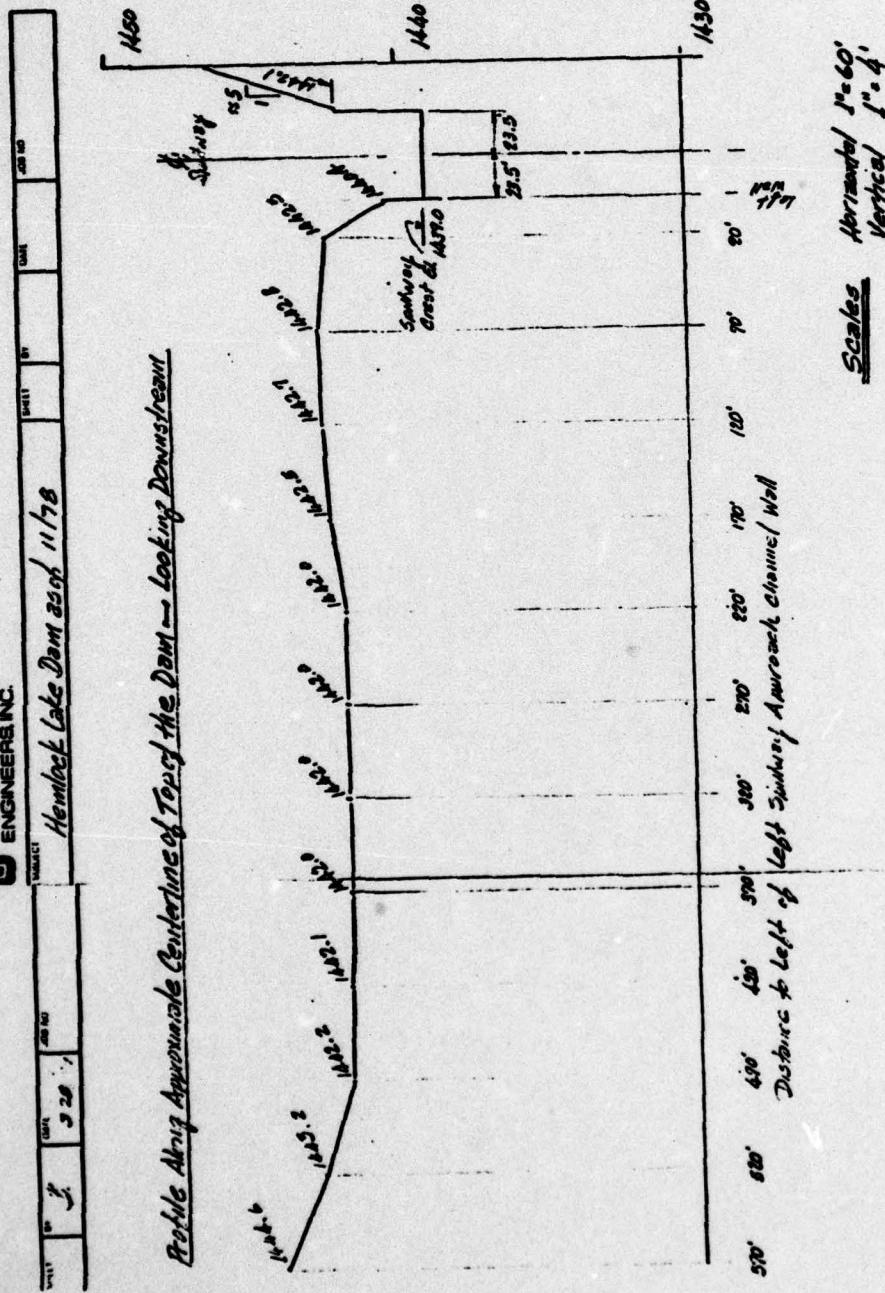
**O'BRIEN & GERE  
ENGINEERS INC.**

Hemlock Lake Devil Bass 01/11/98



**CHIEN & CHERE  
ENGINEERS INC.**

Hemlock Lake Dam 2500 ft 11/78



**HENLOCK LAKE DAM**  
**PROFILE ALONG APPROX. CENTERLINE OF CREST OF DAM**  
**FROM FIELD INSPECTION NOTES**  
**FIELD INSPECTION DATE : NOV. 21, 1978**  
**PLATE NO. 4**

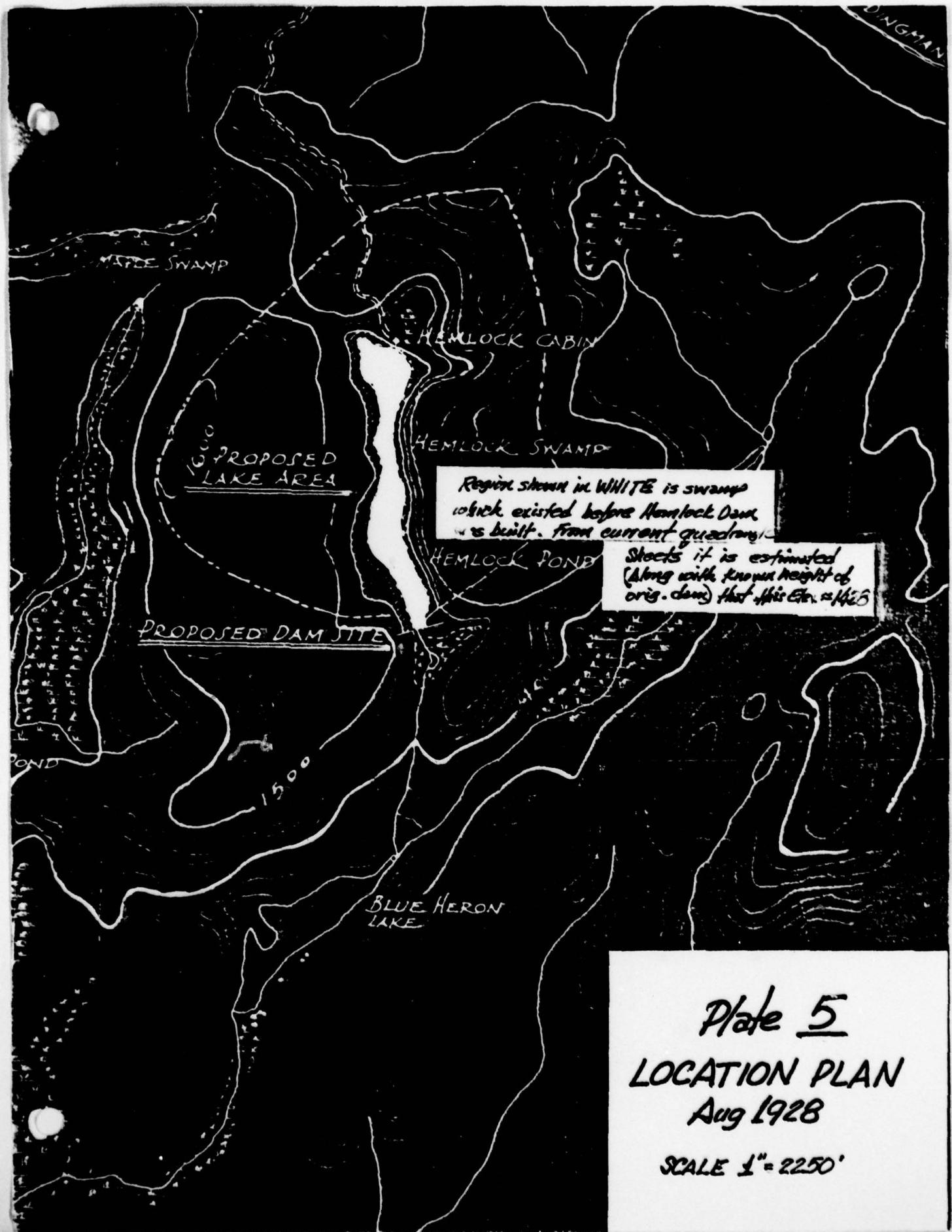


Plate 5  
LOCATION PLAN  
Aug 1928

SCALE 1" = 2250'

**APPENDIX**

**F**

**Site Geology**

## SITE GEOLOGY

### HEMLOCK LAKE DAM

Hemlock Lake Dam is situated in Pike County and within the limits of the Eastern Glaciated section of the Appalachian Plateau physiographic province. Thick deposits of glacially derived rock debris and till mask the underlying near horizontally bedded, red, gray and green shale and sandstone units of the Devonian Catskill group of continental sediments. The dam and lake both rest on glacial till and ground moraine deposits which are dense and compact. The reservoir lies in areas previously covered with high valley swamps and bogs. These features, overlying the dense, compact till, attest to the impervious quality of these sediments.

No known faults or major structural defects are known to occur in the foundation materials in the vicinity of the dam and lake.

It should be noted that core borings shown on the design plan dated December 1930, prepared for construction of Lake Hemlock Dam indicate the presence of limestone in the foundation. For the record it is considered that such is not the case since the occurrence of limestone in the Catskill formation units in Pike County is highly improbable.

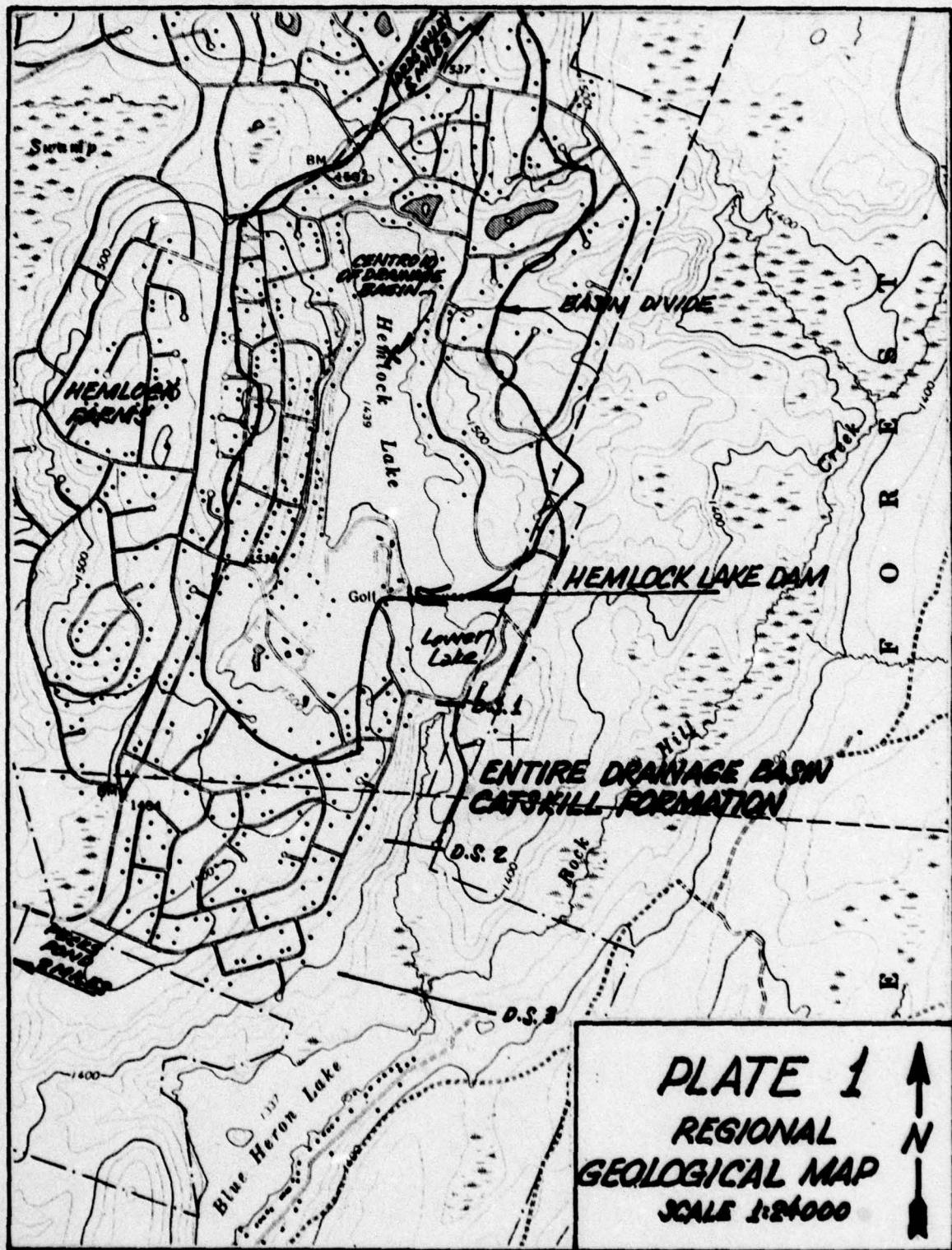


PLATE 1  
REGIONAL  
GEOLOGICAL MAP  
SCALE 1:24000